Internet of Things Towards 5G

The idea of an Internet of Things as a network of smart devices dates far back in the past, with the first applications for automated inventory systems coming as early as 1983.
However, only from 1999 it took momentum, becoming part of a shared vision for the future of Internet. Today, the growing pervasiveness and ubiquity, in almost any context, of small and cheap computing devices, endowed with sensing and communication capabilities, is paving the way to the realization of the IoT vision.
A large variety of communication technologies has gradually emerged, reflecting a large diversity of application domains and of communication requirements. Some of these technologies are prevalent in a specific application domain, such as Bluetooth Low Energy in Personal Area Networks. Others, such as WiFi, Low Power Wide Area Networks (LPWA) [5], and cellular communications (such as 3GPP - 4G machine-type communications, or MTC), have a much broader scope. In addition, such landscape is constantly and rapidly evolving, with new technologies being regularly proposed, and with existing ones moving into new application domains. A rough distinction is emerging between consumer IoT (cIoT) and industrial IoT (iIoT) [6], with clear implications on underlying technologies and business models. Consumer IoT aims at improving the quality of people's life by saving time and money. It involves the interconnection of consumer electronic devices, as well as of (virtually) anything belonging
to user environments such as homes, offices, and cities. Conversely, industrial IoT focuses on the integration between Operational Technology (OT) and Information Technology
(IT) and on how smart machines, networked sensors,
and data analytics can improve business-to-business services
across a wide variety of market sectors and activities, from
manufacturing to public services. In cIoT, desirable features of networked things are low power consumption, ease of installation, integration
and maintenance. Indeed, the quantified self paradigm which is currently unfolding with the advent of fitness and health tracking systems, smart watches and sensor rich smartphones requires a high power efficiency, in order to enable long term monitoring by small, portable devices, as part of a "smart" environment or integrated in our daily wearings.

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At the same time, such applications need to minimize the risk of exposing such sensitive data as someone's health status or life habits. Increasing the number of nodes and of
exchanged information clearly multiplies the potential vulnerabilities to the system to attacks and to privacy leaks.
Differently from cIoT, iIoT evolves from a large base of systems employing machine to machine communications for control process automation and/or monitoring. In such domains, iIoT is the result of the integration, through the Internet, of hardwired and often disconnected islands, usually based on

semi-proprietary protocols and architectures. Such integration magnifies the potential of isolated industrial plants by augmenting their flexibility and manageability, and disclosing the opportunity to deploy new services.
With the final aim of helping the understanding of this rich and variegated context the reminder of this section overviews the modern IoTconnectivity landscape and characterizes in more details the technologies which would potentially have a decisive impactin enabling a global IoT in the upcoming future.